DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
SPECIFICATION

POWER AND CONTROL ASSEMBLY
FOR TWO-BOX VASI
SYSTEM

This amendment forms a part of FAA-E-2372 dated December 5, 1968.

Page 1, paragraph 2.1.1: Delete "FAA-D-2160".

Page 3, paragraph 3.2.2: Delete "6000 between the words "to" and "feet" and insert "10,000".

Page 4, paragraph 3.4.3: Delete the words "and wall bushings" in the first sentence.

Page 5, paragraph 3.5.1: Mounting of power and control assembly in accordance with FAA Drawing D-5749-9.

Page 5, paragraph 3.5.2: In second sentence between the words "be" and "at", delete "3KVA" and insert "2KVA". In the fourth sentence between the words "provide" and "volts", delete "280/140" and insert "192/96". In the fifth sentence between the words "for" and "volt", delete "140/70" and insert "96/48". At the end of the paragraph add the following:

"The no-load output voltage for 240 volts input shall be 280/140 volts and 140/ 2.5 volts ± 1.5%."

Page 5, paragraph 3.5.3: Third sentence between the words "the" and "transformer", delete "3KVA" and insert "2KVA".

Page 6, paragraph 3.5.4.3: Tilt switch is not required under this requirement.

Page 9, paragraph 3.10: In first sentence, delete and substitute therefor:

> "Final approved manuscript reproducible copy shall be furnished as required by the contract schedule."

Page 11, paragraph 4.3.5, line 4: After the words "consisting of", delete "3-300 watts" and insert "3-200 watts".

Page 11, paragraph 4.3.5, line 5: After the words "designated as", delete lamp description "Q6.6A/PAR-643P" and insert "Q6.6A/PAR-642P".

Page 11, paragraph 4.3.5: Seventh sentence, after the words "shall be observed", delete the following:

> "and contactor 'TSC' shall be operated by momentarily disconnecting terminal #4 on 'TB200' from the ground."

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FAA-E-2372
December 5, 1968

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION SPECIFICATION

POWER AND CONTROL ASSEMBLY FOR TWO-BOX VASI SYSTEM

1. SCOPE

1.1 Scope.- This specification sets forth the requirements for a power and control assembly to provide 280/140V and 140/70V power service to an abbreviated visual approach slope indicator (VASI) system consisting of two lamp housing units.

2. APPLICABLE DOCUMENTS

2.1 FAA documents.- The following FAA specification, standards and drawing of the issue specified in the invitation for bids or request for proposals, form part of this specification and are applicable to the extent specified herein.

2.1.1 FAA specification.-

FAA-D-2160	Instruction Books, Electrical and Mechanical

2.1.1.1 FAA standards.-

FAA-STD-012	Paint Systems for Equipment
FAA-STD-013	Quality Control Program Requirements

2.1.2 FAA drawing.-

B-21216	Standard Nameplate

2.2 Federal documents.- The following Federal specification and standard of the issue in effect on the date of invitation for bids or request for proposals shall form a part of this specification and are applicable to the extent specified herein.

2.2.1 Specification.-

TT-E-489	Enamel, Alkyd, Gloss Synthetic (for Exterior and Interior Surfaces)

2.2.2 Standard.-

Fed. Std. 595	Colors

2.3 Military documents.- The following Military documents of the issue in effect on the date of invitation for bids or request for proposals shall form a part of this specification and are applicable to the extent specified herein.

2.3.1 Specifications.-

MIL-E-5272	Environmental Testing Aeronautical and Associated Equipment
MIL-E-17555	Electronic and Electrical Equipment and Associated Repair Parts, Preparation for Delivery of

2.3.2 Standard.-

STD. MS33586	Metals, Definition of Dissimilar

2.4 Other publications.- The following publications, of the issue in effect on the date of the invitation for bids or requests for proposals, form part of this specification and are applicable to the extent specified herein.

2.4.1 National Electrical Manufacturers Association (NEMA) Standards.-

SG-5	Standards for Power Switchgear Assemblies
C89.1	American Standard Requirements and Terminology for Specialty Transformers

2.4.2 National Board of Fire Underwriters Standard.-

Year of latest issue	National Electrical Code

(Copies of this specification and other applicable FAA specification and standards may be obtained from the Contracting Officer in the Federal Aviation Administration office issuing the invitation for bids or requests for proposals. Requests should fully identify material desired, i.e. specification or standard number and date. Requests should cite the invitation for bids, request for proposal, or contract involved or other use to be made of the requested material.)

(Information on obtaining Federal specifications and standards may be obtained from General Services Administration offices in Washington, D. C., Atlanta, Boston, Chicago, Denver, Kansas City, Missouri, New York, San Francisco and Seattle.)

(Single copies of Military specifications and standards may be obtained from Federal Aviation Administration, Washington, D. C. 20590, ATTN: Contracting Officer. Requests should cite the invitation for bids, request for proposals, or contract for which the material is needed. Mail requests, if found acceptable, will be forwarded to a Military supply depot for filling; hence, ample time should be allowed.)

(Information on obtaining NEMA standards may be obtained from the National Electrical Manufacturers Association, 155 East 44th Street, New York, New York. Information on obtaining the National Electrical Code from the National Board of Fire Underwriters, 85 John Street, New York, New York.)

3. REQUIREMENTS

3.1 Equipment to be furnished by the contractor.- The equipment required under this specification shall include the complete power and control assembly including all components (paragraph 3.5). Instruction books shall be furnished (3.10).

3.2 Environmental requirements.- The equipment shall be designed for outdoor installation and continuous operation in driving rain, hail, sleet and snow, and under the following environmental conditions.

3.2.1 Temperature.- A temperature range from -55°C to +55°C.

3.2.2 Altitude.- Any altitude from sea level to 6,000 feet above sea level.

3.2.3 Humidity.- A humidity range from 10% to 95% at +55°C ambient temperature.

3.2.4 Sand and dust.- Exposure to airborne sand particles encountered in arid regions.

3.2.5 Salt spray.- Exposure to salt laden atmosphere.

3.3 Operational requirements.- The equipment described herein shall be required to supply power for operation of a two-box VASI system on two intensity steps of light output as follows: 95% to 100% for daytime operation and approximately 8.5% for night operation. The power shall be supplied by a two-winding transformer (3.5.2) equipped with proper secondary voltage taps for selection of the day and night light output by a photoelectric switching device (3.5.4.5) and relay system. The 240V lines of the 120/240 volt input to the power and control assembly, terminating on the input terminals within, shall connect to the transformer primary through a 2-pole main circuit breaker (3.5.4.2). Contactor "BC" (3.5.4.3) with its 2-pole double-throw contacts in the secondary output and its coil, operated by the photoelectric switching device, shall connect 140/70 or 280/140 volts to the 3 wire output, thus operating the lights with either approximately 8.5% or 95%-100% light output. The photoelectric device shall operate this output contactor from the low output position to the high output position when the illumination on a vertical surface facing North exceeds 58 $\pm$ 2 foot candles and transfer the contactor to the low output position when the illumination drops to 35 $\pm$ 2 foot candles.

3.4 Materials and parts requirements.- Material and equipment component parts shall be as specified herein; commercial parts, or materials not specifically designated, shall be suitable for the purpose and shall be in accordance with the best industrial standards and practices. All parts shall deter corrosion and oxidation.

3.4.1 Metals.- Metals shall be either inherently corrosion resistant or suitably protected to resist corrosion or oxidation. The use of dissimilar metals in contact with one another shall be avoided wherever practicable. However, if their use cannot be avoided, they shall be used in accordance with Military Standard #MS33586. Parts may be suitably coated to prevent corrosion or seizing of parts requiring removal for servicing.

3.4.2 Gasket materials.- Materials used for gaskets shall be made of rubber or rubber like compound suitable for the intended purpose, such as for door seal, dust cover gaskets, grommets, etc.

3.4.3 Porcelain.- Porcelain shall be used as insulating material for fuse blocks and wall bushings. Wherever used, porcelain shall be glazed to avoid absorption of moisture.

3.4.4 Cables and wires.- Cables and wires used for connection of the power and control wiring within the unit shall be as specified under wiring, paragraph 3.8.2, or elsewhere in this specification.

3.4.5 Component ratings.- Where component ratings are not specified hereinafter they shall be selected such that components are not operated in excess of 80% of their normally derated maximum values for the temperatures encountered under the specified equipment environmental conditions.

3.5 Design requirements.-

3.5.1 General.- The power and control assembly shall form one compact self-cooled unit suitable for installation on a single vertical pole. The unit shall consist of an outdoor dry type transformer and a control cabinet solidly attached to the bottom of the transformer. Pole-mounting brackets shall be part of the unit. Detailed description of the components is provided in the following sub-paragraphs (see also Figure 1).

3.5.2 Transformer.- The transformer shall be dry type, self-cooled and shall be designed for continuous outdoor service under the environmental conditions specified in paragraph 3.2. The rating shall be 3 kVA, at 240 volts, 60 Hz input. Six 2.5% primary voltage taps shall be provided, three above and three below normal, with a manually operated tap changer for selection of the proper tap closest to the value of the input voltage. The tap changer and its operating handle shall be located in the control cabinet (3.5.3). The secondary winding shall provide 280/140 volts maximum output with grounded center tap. Additional secondary taps shall be provided for 140/70 volt 3 wire output. The transformer shall be a general purpose transformer conforming to NEMA Standard No. C89.1, latest revision thereof, on specialty transformers.

3.5.3 Control cabinet.- The control cabinet shall include the manually operated tap changer and all power and control components (3.5.4), including terminal blocks and protective devices, completely wired. The cabinet shall be an outdoor, raintight, NEMA type enclosure of sufficient size, and shall be attached to the bottom of the transformer. The inside of the cabinet shall be divided into two compartments; one housing the components referred to above, and the other, enclosing the four resistors, which shall be connected in the output lines of the 3 kVA transformer (See Figure 1). Adequate, chimney-effect ventilation shall be provided in the resistor compartment with the resistors physically arranged as specified in paragraph 3.5.4.6. Proper high-temperature switchboard wires, with flame retardant insulation and impregnated asbestos covering, shall connect the resistors to the transformer secondary terminals and to the output contactor, using porcelain wall bushings in the wall separating the two compartments. A dead front panel equipped with four knurled tum screws shall be provided to cover the resistor compartment. Proper identification of the resistors and instructions for raising and lowering voltage by the adjustable terminal shall be stencilled on the face of the dead front panel in not less than 1/4 inch letters. In addition a warning shall be displayed cautioning that the dead front panel must not be touched carelessly, since it might be hot. Knockouts are not required. However, sufficient wiring space shall be provided in the bottom of the cabinet for all wiring (input, output and internal) and for all terminal blocks. Access to the interior of the cabinet (both compartments) shall be provided through one hinged and gasketed door equipped with a three point latch-set with provision for padlocking. The padlock hasp shall have a 7/16" hole. (Padlock are not required to be furnished under this specification.) The door shall be able to open 180 degrees and an internal latch shall be

provided to hold the door in this position. The internal face portion of the door shall include a pocket to hold an instruction book. A metal frame shall be tack-welded on this pocket for the wiring diagram (3.11). The door when closed shall be raintight. Louvers shall be provided on the control and resistor compartments of the cabinet for ventilation and screened with No. 14 bronze wire mesh. Baffles shall back-up the louver openings to prevent anyone inserting metal rods, sticks or wires which could come in contact with live voltage parts. An internal ground lug shall be provided in the cabinet for grounding using a #6 AWG bare, solid copper wire.

3.5.4 Components.- The following component parts shall be provided within the control cabinet in addition to the transformer tap changer.

3.5.4.1 Terminal blocks.- One input and one output terminal block, of the enclosed base type, and each with screw pressure terminals suitable for #2 AWG through #8 AWG standard conductors, shall be provided. One control-wire terminal block with pressure terminals for five #12 AWG solid wires shall be provided. Each pressure type terminal shall be equipped with a pressure plate to prevent the tip of the screw turning directly on the wire. Separators are required between the terminals; these shall be integrally molded with the base material. The separators shall be of adequate design to prevent current leakage due to humidity. Marking strips shall be furnished.

3.5.4.2 Air circuit breaker.- A 2-pole, 20-ampere trip, molded-case air circuit breaker on mounting bracket, with individual thermal magnetic trips and at least 7,500 amperes RMS interrupting capacity shall be provided as a main circuit breaker. The breaker mechanism shall be of the quick make and quick break type, with an arc-quenching chamber. The breaker terminals shall accommodate at least #6 AWG stranded conductors.

3.5.4.3 Contactors.- A 2-pole double throw, 480V AC open type contactor ("BC") shall be provided in the output with two normally closed and two normally open 30 ampere contacts and 120V, 60 Hz operating coil for continuous operation, mechanically held in "off" (unenergized) position. The contacts shall be break before make. Another 2-pole, single throw contactor ("TSC") with two normally open contacts, held by spring in unenergized position, shall be required in the output circuit, to close this circuit when the system is operating, and open this circuit when the ground is removed from the operating coil by the tilt switch in either of the lamp housing assemblies. (The tilt switch is not required under this specification). Otherwise, this contactor shall be equal to the contactor above. The inrush current to each coil of the contactors specified herein shall not exceed 1.5 amperes and the holding current for each coil shall not exceed 0.5 amperes. Wiring of the contactor coils and contacts shall be as in Figure 1.

3.5.4.4 Fuses.- Fuses with fuse holders shall be required as follows: (These shall be furnished in the proper rating for protection of the connected equipment and circuits.) Two each slow-blow fuses of the required ampere rating shall be installed on 600V AC fuse holders in each "live" output wire of the

transformer secondary. One fuse of proper rating shall be required for the 120-volt service to the photoelectric switching device and for two contactor coils. (A fusing schedule shall be included in the instruction book (3.10) in case one photoelectric device shall be used in the field to operate the contactors in two and in three adjacent control cabinets). The fuse holders shall be on glazed porcelain base of the barrier type.

3.5.4.5 Photoelectric switching device.- A light-intensity activated device shall be provided within the cabinet, enclosed in its own indoor type housing, for low and high intensity control of the visual approach slope indicator lights. All operating components of this device shall be in its housing and only the light collector shall be for external mounting and connection in the field. The normally open single main contact of this device shall be rated at least 20 amperes at 120 volts and wired between terminals C4 and C5 on "TB300" of Figure 1. All components in the housing of the device shall be factory wired, fused and, at 120 volts input, the applicable features set to close its main contact (and thus close the high output contacts of "BC" contactor) when the illumination on a vertical surface facing North reaches 58 ($\pm$2) foot-candles (turn-on value) and, open its contact (and connect the low output) when the illumination falls to 35 ($\pm$2) foot-candles (turn-off value). The "on-off" points should not vary more than $\pm$2 foot-candles with line voltage variations from 115 to 125 volts and not more than $\pm$3 foot-candles with line voltage variation from 108V to 115V and from 125V to 132V, within the ambient temperature range of -55°C to +55°C. A single electrical control shall be provided to adjust the "turn-off" value between 25 and 45 foot-candles. A time delay of 5 to 8 seconds shall be provided to prevent the main contact from closing due to transient light flashers. A fail-safe feature shall open the main contact when the device fails. Components shall be protected from transient surges up to 2500 volts. The light collector shall be for 1/2" standard conduit mounting, and be able to turn and lock in position on the conduit. The light collector shall be hermetically sealed and its rated output higher than the operational demand. A 5-foot long cable lead shall be provided with the light collector, and attached thereto, for field connections to the housing components. Proper terminal markings shall be provided.

3.5.4.6 Resistors.- Four heavy-duty, open wire-wound resistors on square form shall be mounted in horizontal position in the resistor compartment of the control cabinet; the higher wattage resistors, specified below, shall be mounted above the lower rating resistors, with at least 7 inches of separation between each resistor and any other, to afford ready access to the adjustable terminals. Each resistor shall be provided with an adjustable terminal for setting of the resistance as required for the particular installation. The resistors shall be designed for 600 volts between terminals and, at least, for 250 volts between each terminal and the mounting hardware. The resistance wire material shall be corrosion resistant. Resistors shall have the following values and minimum wattage rating at 35°C (see 3.4.5 for derating requirements).

(a) Two each, 1.8 ohms ± 10%, 120 watt

(b) Two each, 1.7 ohms ± 10%, 270 watt

Testing of the resistors shall be in accordance with paragraph 4.3.6.

3.5.5 Repairs.- The design of the power and control assembly shall be such that adjustment and repairs can be made in the field with commercially available simple tools. Special tools, if required for servicing, shall be furnished by the contractor.

3.5.6 Interchangeability.- All parts of the unit furnished under a single procurement shall be manufactured to such tolerance that will permit interchangeability of any part with a similar part of any other unit.

3.6 Workmanship.- The power and control assembly shall be fabricated in accordance with the best industry practices. Welds, seams, corners and edges shall be carefully constructed to eliminate sharp edges, unsightly protrusions, and when completed, present smooth accurate bends and corners. All grease, oil, welding flux and dirt shall be removed prior to painting.

3.7 Nameplate.- A nameplate conforming to Drawing B-21216 shall be permanently attached to each assembly with four 430 or 18-8 stainless steel rivets.

3.7.1 Equipment title.- The equipment title shall be "Power and Control Assembly for 2-Box VASI."

3.7.2 Nameplate location.- The nameplate shall be centrally located on the outer upper portion of the control cabinet door.

3.8 Assembly, wiring and marking.

3.8.1 Assembly.- Assembly of all parts shall be in a permanent manner with the components accessible for servicing, replacement or repairs. Bolts used in assembling the parts in the control cabinet shall be equipped with captive nuts, they shall be of sufficient length that at least three full threads will show over the nut after tightening and they shall not be removable from the outside. Stainless steel lockwashers of the internal teeth type shall be used on all bolts where good electrical continuity is required for grounding and to prevent nuts becoming loose.

3.8.2 Wiring.- Connecting wires used shall be copper of the proper insulation rating and adequate AWG size for the application. Unless otherwise specified, the wires and wiring shall conform to the National Electrical Code for panelboard wiring. Insulated conductors may be closely grouped together, the bundles secured with flame retardant lacing or wiring clips and properly trained and supported so as to avoid strain on the connections. Wire bends with short radii will not be permitted. When removing insulation from the wire ends, care shall be taken to avoid nicking or cutting the conductors.

3.8.3 Marking.- All equipment components shall be clearly identified by nameplates or bold permanent type stencils. Identification markings shall agree with designations on the wiring diagram and parts list. All control wires shall be provided with end identification in the form of a plastic band around the wire with identifying markings permanently stamped thereon, or with the markings permanently stamped into the wire itself. All power conductors shall be similarly marked, except that a permanently stamped rigid laminate tag may be attached near the cable ends in lieu of the above. The terminating points for all wires and cables at terminal blocks shall be clearly identified corresponding to the circuit and terminal designations as shown on the wiring diagram. The fuse sizes shall be stenciled adjacent to fuse blocks on their mountings.

3.9 Painting.- All exterior and interior surfaces of the unit shall be suitably prepared for painting and sprayed with one coat of rust-resistant primer surfacer and dried. System #FS-3(1) of FAA-STD-012 shall be applicable. When thoroughly dry, all outside surfaces shall be painted with not less than a body coat, and a finish coat of air drying enamel. The body and finish coat shall be of the same color, but the primer coat shall be of a color easily distinguishable from the other two coats. The final painted surfaces must be free of blotches, scratches and runs, and shall be in accordance with general practices for such work. The paint shall be applied in at least 3.0 mil thickness and shall meet the requirements of Federal Specification No. TT-E-489. The color shall be aviation gloss orange No. 12197 in accordance with Federal Standard No. 595. The interior of the cabinet shall be finished with baked gray enamel, color No. 16314, in accordance with Federal Standard No. 595. All threads shall be free of paint.

3.10 Instruction books.- Two instruction books shall be furnished with each power and control assembly and shall be in accordance with specification FAA-D-2160. A fusing schedule shall be included in the instruction book as specified in paragraph 3.5.4.4.

3.11 Wiring diagram.- A complete connection diagram of the electrical circuits shall be furnished for insertion into the metal frame on the inner face of the instruction book pocket on the control cabinet door (3.5.3). The diagram shall be in black lines on white background produced by printing or photographic methods and enclosed between two 0.015 inch (min.) thick, clear plastic sheets. All leads and terminals shall be identified on the connection diagram, prefixed by a letter to indicate wire color. The diagram shall be sufficiently large to be easily read in the mounted position.

4. QUALITY ASSURANCE PROVISIONS

4.1 Quality control program requirements.- The contractor shall provide and maintain a quality control program in accordance with the requirements of FAA-STD-013.

4.2 Test requirements.- Testing of the equipment shall be performed in two categories as follows:

4.2.1 First unit of production.- The first unit of production is defined as a prototype of all units in physical, chemical and electrical characteristics and material properties which the contractor proposes to furnish under the contract terms. Successful completion of the specified inspection and testing of this unit will release the production units for testing. The release shall be made by the Contracting Officer or by his designated technical representative. The first unit of production shall undergo the inspection and testing specified in paragraphs 4.3.1.1, 4.3.2 through 4.3.6.

4.2.2 Production units.- Each production unit shall undergo the tests specified in paragraphs 4.3.1.2, 4.3.3 and 4.3.7.

4.3 Test Procedures.

4.3.1 Visual inspection.

4.3.1.1 First unit of production.- The first unit of the power and control assembly shall be visually inspected for conformance to the requirements of the specifications including the adequacy of contractor selected components and the establishment of agreement between the physical equipment, drawings, and parts lists.

4.3.1.2 Production units.- Each production unit power and control assembly shall be inspected against defects in workmanship and materials and for completeness and conformance with the design of the first unit of production.

4.3.2 Rain test.- The rain test shall be conducted on the complete power and control assembly. The assembly shall be checked for watertightness (within the meaning of NEMA definition SG-5-1.018) by simulating a driving rain on all exterior joints, doors, bolted panels and on the enclosures in general. This test shall be in accordance with Procedure II, paragraph 4.10.2 of MIL-E-5272.

4.3.3 Dielectric test.- A dielectric test shall be made on all power and control components and wiring of the first unit of production and on each production unit. The tests shall be made using 60 Hz AC voltage applied for one minute between insulated parts and ground.

All power wiring	1.5 kV
240V transformer winding	2.5 kV
280V transformer winding	4.0 kV
All control equipment and control wiring	1.0 kV

4.3.4 Temperature rise test.- A temperature rise test on the first unit of production assembly shall be performed on all windings independently

to show that the temperature rise of any component part does not exceed that specified in NEMA Standard C89.1 under any of the specified input voltage conditions. For this test the transformer shall be loaded with currents equivalent to 2.5 kVA, 1.0 PF load, in lieu of 3 kVA, and operated until the temperature has stabilized. Temperature rise of all windings shall be obtained by the resistance method as follows:

$$\text{Temperature Rise } (^{o}\text{C.}) = (234.5^{*} + T_c{}^{o}) \frac{(R_h - R_c)}{R_c}$$

Where $T_c{}^{o}$ = Temperature (^{o}C.) corresponding to Cold Resistance

R_c = Cold Resistance

R_h = Hot Resistance

*This figure is for copper.

4.3.5 Performance tests.- At room ambient temperature the complete first unit of production power and control assembly shall be connected to a 120/240 volt 60 Hz single phase power source, and to a load consisting of 3-300 watt, 6.6 ampere, series connected PAR -64 lamps, designated as Q6.6A/PAR-64/3P, in each of the two output legs. Sufficient series resistance shall be added in each "live" output leg to limit current to the 6.6 ampere lamp rating when the voltage input to the power and control assembly is at 240 volts and the primary tap switch is set in the 240 volt position. The light collector shall be electrically connected to the assembly and operation, within the foot candle limits as set forth in paragraph 3.5.4.5 of this specification, shall be demonstrated. With the load currents properly adjusted to 6.6 amperes by the series resistors in the high output lines, the voltage drop across each set of three lamps shall be checked and recorded on the test data sheet. This voltage shall also be obtained, when all resistance is inserted in the high output lines. Similar procedure shall be followed in determining the voltage across the two sets of three lamps, with the resistors in the low output lines set for 4.5 amperes, and when all resistance is inserted. Current reading shall also be recorded on the test data sheet with all resistance "in" on the high and low outputs. During this test, operation of contactor "BC" (see Figure 1) shall be observed and contactor "TSC" shall be operated by momentarily disconnecting terminal #4 on "TB 200" from the ground. North sky-light or a certified light with a color temperature of 6500K shall be used in testing the light collector. The input voltage, at no load, shall be externally adjusted to 240(-)7.5%, (-)5%(-)2.5%, (±)0%, (+)2.5%, (+)5% and (+)7.5%, with the tap changing switch moved to the corresponding position simultaneously. The output voltage of no load shall not deviate more than ±1% from the 280/140 volt level and ±0.5% from the 140/70 volt level at any of the seven input voltage taps.

4.3.5.1 High and low temperature test.- With the input voltage tap set to 240 volts and the series resistors adjusted to 6.6 amperes at the prevailing room ambient temperature, the entire power and control assembly, including the light collector, shall be placed in an environmental chamber. The chamber shall be provided with a viewing window and provision for bringing in power and load leads. Temperature readings shall be required on the top of the transformer case and on top of the resistor compartment of the control cabinet. Humidity and altitude control is not required. The temperature within the chamber shall be raised to +55°C. ±1°. After a period of not less than 2 hours at this temperature, the lamp load shall be connected and the power and control assembly shall be energized for a period of not less than 6 hours. The lights shall be operated at the high brightness step during this test except that periodically the photoelectric switching device shall be activated to prove continued operation of this device, within required limits at elevated temperatures. Temperatures of the top of the transformer case and on top of the resistor compartment shall be observed on an hourly basis. After completion of this test, the temperature of the chamber shall be lowered to -55°C. ±1° and after 4 hours or more at this temperature the power and control assembly shall again be energized for at least 2 hours and the photocell control unit activated to prove continued operation at low ambient temperatures within the sky light tolerances specified in paragraph 3.5.4.5. During the operating periods of this test the tap switch shall be placed in the 240 volt position and the input voltage shall be regulated to within ±1% of 240 volts. The movement of air through the environmental chamber shall not be greater than that necessary to maintain temperature and at no time shall moving air be forced over the surface of the unit under test or over the photocell control unit controlling the power output level of the power and control assembly. The current through the lamps and the voltage across the lamps shall be checked on an hourly basis and recorded on the test data sheet.

4.3.6 Resistor test.- One set of production model resistors, consisting of two 1.8 ohm, 120 watt units and two 1.7 ohm, 270 watt units, shall be tested in the resistor compartment of the control cabinet, with the dead-front panel in-place and the cabinet door closed. A thermometer or thermocouple shall be placed on the top center of the resistor compartment. The resistors shall be disconnected from their respective circuits and their cold resistance (full turn resistance) measured. Testing shall be at the prevailing room ambient temperature, with 4.5 amperes through the two 1.8 ohm resistors for 2 hours, or until the temperature (as measured on the top of the control cabinet) stabilizes. Next the two 1.7 ohm resistors shall be tested with 6.6 amperes until the temperature stabilizes, but not less than 4 hours. The voltage drop across each of the four resistors shall be measured and recorded on the test data sheets, showing also the corresponding ambient and finally the hot resistance values. Only the natural ventilation shall be permitted through the resistor compartment and on the outside of the cabinet. Calculation shall be performed utilizing the observed data to confirm the requirement of 3.4.5. The inside temperature in the resistor compartment shall have no damaging effect on the painted surfaces. If the measured temperature rise

exceeds 40°C above the outside ambient, corrective measures shall be taken either by improving the ventilation of the resistor compartment or by providing asbestos sheet lining material. After the corrections the test shall be repeated.

4.3.7 Performance tests, production units.- Each production unit shall be connected to a power source and to a load as described in paragraph 4.3.5. The circuit breaker shall be used for "on-off" control and the photocell control unit shall be employed to check operation of all components at the two required intensity levels. At no load the secondary voltages shall be checked to determine conformance to the output voltage limitations specified in paragraph 4.3.5 at each of the two intensity levels, when the primary voltage is varied ±7.5% in 2.5% increments and each time the tap changer is set to the corresponding tap.

5. PREPARATION FOR DELIVERY

5.1 General.- Unless otherwise specified in the contract, the equipment shall be prepared for domestic shipment in accordance with the following subparagraphs.

5.2 Packaging.- Packaging of the equipment shall be as follows:

5.2.1 Ancilliary equipment.- The light collector of the photoelectric switching device shall be unit packaged in accordance with Specification MIL-E-17555, Level A, Method II.

5.2.2 Power and control assembly.- The assembly shall be unit packaged in accordance with Specification MIL-E-17555, Level A, Method III.

5.3 Packing.-

5.3.1 Ancilliary equipment.- The light collector shall be unit packed in a shipping container conforming to Specification MIL-E-17555, Level B.

5.3.2 Power and control assembly.- The assembly shall be unit packed in a shipping container conforming to Specification MIL-E-17555, Level B.

5.4 Marking.- Marking shall be in accordance with Paragraph 3.13 of MIL-E-17555. Identification shall include the following: (Example in parenthesis)

Name: (Light Collector for 2-Box VASI, or, Power and Control Assembly for 2-Box VASI, as applicable.)
Specification: FAA-E-2372
FAA Contract or Order No.: _____
Manufacturer's Name or Trademark: _____
Manufacturer/Contractor's name and address: _____
Power and Control Assembly Serial Number: _____

6. NOTES

6.1.- None

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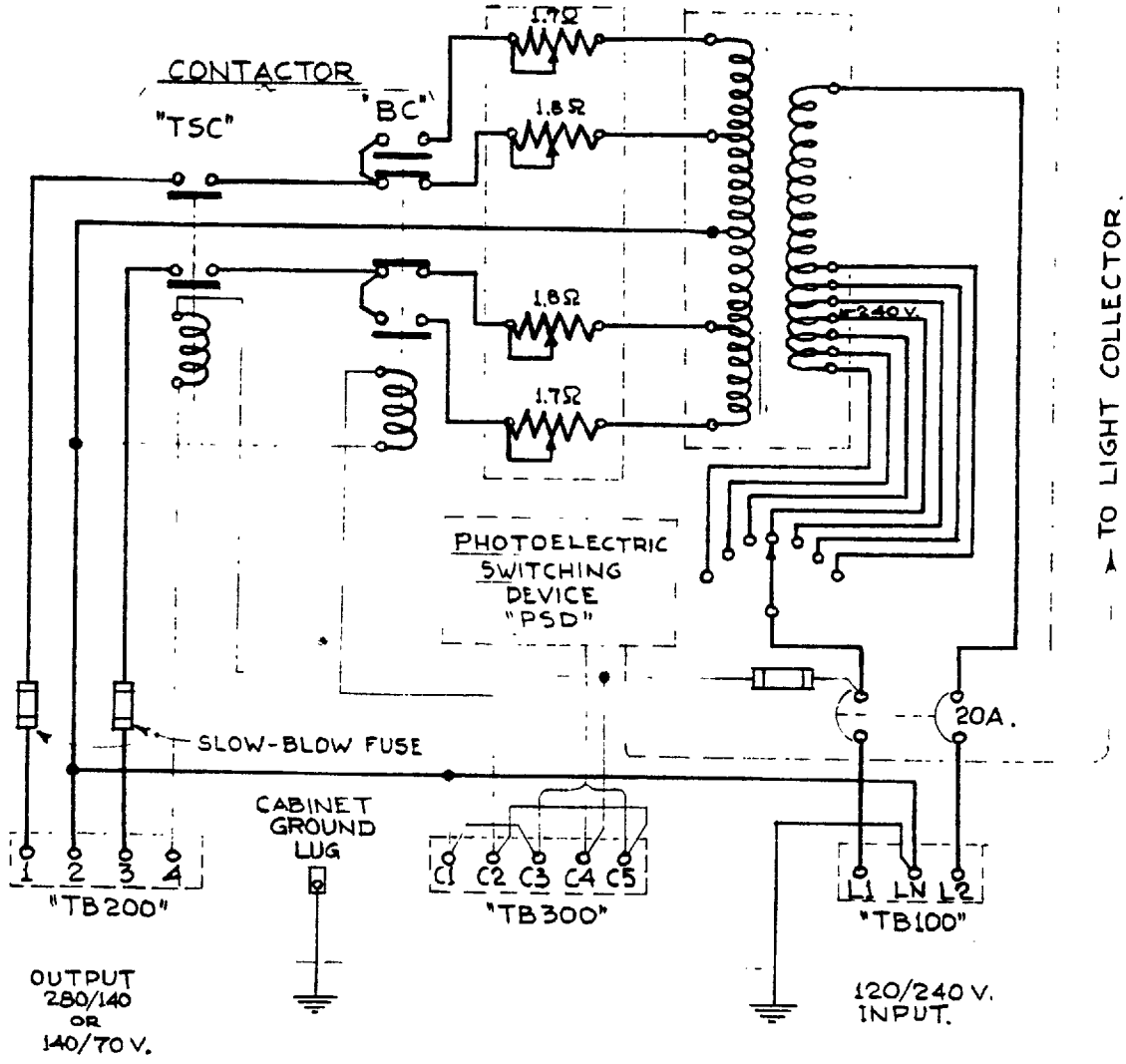
FOR FIGURE 1, SEE PAGE 15



2-BOX VASI

POWER & CONTROL ASSEMBLY

PROPOSED WIRING DIAGRAM

FIGURE 1.